

# Pipeline



*Small Community Wastewater Issues Explained to the Public*

## Residential Runoff—Slow It Down, Keep It Clean

**T**he rain and snow that flows away from your home and property has great potential for adversely affecting your community's source water. According to the most recent National Water Quality Inventory, runoff from urbanized areas is the leading source of degradation to all water. As one of the earth's caretakers, there are steps you can take to help reduce these effects.

### Limit Paved Surfaces

A large part of our residential landscape is covered by paved surfaces such as sidewalks, parking lots, roads, and driveways. Due to the solid surfaces like pavement and rooftops, a typical city block generates five times more runoff than a forested area of the same size.

These paved surfaces prevent water from percolating into the ground and instead cause runoff to flow into storm drains. This rain or snowmelt also picks up heat from the paved surfaces as well as oil, grease and trash, all negatively affecting the receiving water.

To reduce runoff from the solid surfaces around your home, replace them if possible with porous surfaces. Sidewalks and driveways can be replaced with small paving blocks, porous paving asphalt, cobbles or gravel. Paved sidewalks and patios can be exchanged for wooden decking, gravel, brick, paving stones, mulch, grass or other natural groundcovers. These permeable surfaces allow rainwater and snow to slowly seep into the ground.

### Build a Rain Garden

Rain gardens are specially designed low areas landscaped with plants that soak up stormwater from your roof, driveway and other solid surfaces. They can also be used as a buffer to shoreline areas to capture runoff from the home landscape before it enters a lake, pond or river. To reduce storm drain overload, many states are encouraging homeowners to install rain gardens.

These shallow depressions or retention ponds hold runoff



An established rain garden. Photo courtesy of the Wisconsin Department of Natural Resources.



and give water time to soak slowly into the ground, thereby reducing localized flooding and allowing the impurities to settle out, recharging the groundwater. Researchers are studying the possibility of rain gardens to remove other pollutants besides the heavy metals and phosphorus that they are now known to remove. These specialized gardens also create an appealing natural area that will attract birds

and butterflies, while improving local water quality.

A rain garden can be as simple or as complicated as you want. You can construct it yourself if the design is simple or hire special contractors for more elaborate schemes. If possible, this retention pond should be placed in a naturally-occurring low spot in your yard. You will have to dig to create such a depression if the landscape is level. Depending on the drainage potential of your local soils, you may have to replace some of the soil with sand or gravel to encourage adequate drainage. Your rain garden should drain within four hours after a one-inch rain event. You must prevent standing water that allows mosquitoes to breed.

Rain gardens should be situated at least 10 feet from your house but near a gutter outlet or a paved surface. However, they should not be built over the septic tank, near any walls or over any buried utilities.

The plants you choose should be able to tolerate both wet and dry conditions. Most rain gardens are dry the majority of the time. Native plants are often the best choices for these situations; many wildflowers, sedges, ferns, shrubs and small trees tolerate the wet/dry cycle of rain gardens. Rain garden plants should be

## Why plant a rain garden?

Rain gardens are beneficial to our environment in several ways. They:

- Reduce the amount of pollutants that wash into lakes, streams ponds and wetlands;
- Help sustain adequate stream flow during dry spells through infiltration and recharge;
- Enhance the beauty of your yard and the neighborhood;
- Help protect communities from flooding and drainage problems;
- Reduce the need for costly municipal stormwater treatment structures.

*Adapted from University of Wisconsin Extension, Rain Gardens: A How-to Manual for Homeowners.*

selected to match this situation. Your local extension agent should be able to suggest suitable varieties.

Rain gardens require some maintenance to function properly. During the first year, the most important work is watering and weeding. A young garden needs about an inch of water per week until it is established. An established garden needs to be weeded, cleared of plant debris and re-mulched in the spring and fall.

## Use a Rain Barrel

Rainwater harvesting, collecting rain-

water from impervious surfaces and storing it for use later, is a technique that has been used for millennia. Recently, many areas of the U.S. have been experiencing extensive periods of drought,

*It is estimated that residential water use can increase between 40 and 50 percent during summer months because of outdoor water use, and a rain barrel can save up to 1,300 gallons of water during this period.*



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and restrictions are being placed on watering lawns and landscape plantings or washing cars. Instead of using costly treated water from a municipal treatment plant to soak your lawn, rain barrels provide a free irrigation source. By providing short-term storage of this naturally chemical-free water, the use of rain barrels makes landscape watering possible even during times of water restrictions.

Rain barrels collect and store rainwater from rooftops. Water from your roof is collected from the gutters and piped to a container. Stored rainwater can be recycled for watering lawns, gardens and trees and to wash your car. It is estimated that residential water use can increase between 40 and 50 percent during summer months because of outdoor water use, and a rain barrel can save up to 1,300 gallons of water during this period.

Rain barrels are inexpensive, easy to install and easy to operate and maintain. They

can be purchased ready-made from a garden center or online, or they can be homemade from food grade plastic barrels or trash bins. Flexible downspout elbows make hookup easy. Rain barrels come in a variety of materials, from plastic to wood to terra cotta, and are commercially designed in a variety of shapes and sizes. They range in cost depending on size, style and added features. Some communities are offering "make a rain barrel" workshops to encourage their use; others are offering rain barrels for sale at much reduced rates.

Water from your roof may contain bacteria and other disease-causing organisms from bird and other animal waste. Rain barrel water is fine if used on non-edible plants such as landscape plants and flowers but should not be used on vegetable plants close to harvest time. Always wash your harvested vegetables thoroughly with potable water before using.

### What are the threats to source water?

*Many contaminants might be present in source water before it's treated, including:*

- Fertilizers, herbicides, and insecticides from agricultural lands and residential areas;
- Oil, grease, and toxic chemicals from urban runoff and energy production;
- Sediment from improperly managed construction sites, crop and forestlands, and eroding stream banks;
- Salt from irrigation practices and acid drainage from abandoned mines;
- Bacteria and nutrients from livestock, pet wastes, and faulty septic systems.

*Keeping pollutants out of stormwater is less expensive than trying to clean up the water in treatment plants.*

*Adapted from The U.S. Environmental Protection Agency.*

The size of your rain barrel depends on the size of the rooftop surface area that drains to it. A general rule of thumb is that one inch of rainfall on a 1,000 square foot roof will yield approximately 600 gallons. You can roughly calculate your home's needs by multiplying the square footage of your roof by 625 and then dividing by 1,000. Multiple barrels can be plumbed in a series if necessary.

For convenience, most barrels have a spigot near the bottom, allowing watering cans to be filled. Rain barrels are usually perched on blocks or a sturdy rack for easier access to this spigot. They can also be plumbed directly into existing irrigation systems.

A rain barrel should be emptied and rinsed out once a



Rain barrels plumbed in tandem. Photo courtesy of the University of Rhode Island Cooperative Extension Water Quality Program.



month. It is also a good idea to keep gutters free of debris. If algae begins growing in the barrel, a tablespoon of household bleach will stop its growth but will not hurt plants. The top of the barrel must be tightly sealed or screened to prevent mosquitoes from breeding in the water and to prevent access by any animals or children. In cold regions, empty the barrel before freezing weather.

These rain-catching systems are a great way to slow down the flow of stormwater from your property and provide a free water source for dry spells in your garden.

Saving free rainwater for drier times just makes good sense. Watershed groups and local governments encourage the installation of rain barrels or cisterns, but permitting codes vary across the country. While some cities require rainwater harvesting systems be incorporated in all new construction, others place restrictions on the practice. Be sure to check with your local building codes or health department before installing a system.

### Keep Runoff Clean

Contamination of drinking water sources can cause a community significant expense and threaten public health. The well-known stories about environmental problems tend to focus on big, recognizable targets such as leaking toxic waste dumps and messy oil spills, but so-called nonpoint source pollution is the nation's leading source of water quality degradation. Whether your tap water comes from surface or groundwater, all drinking water sources are vulnerable

to a variety of contaminants from an assortment of activities.

As the water moves across various landscapes, such as plowed agricultural fields, parking lots and residential backyards, it picks up soil particles, fertilizers, pesticides, animal waste, road salt, motor oil and other pollutants. This type of pollution is called nonpoint source pollution. Although individual homes contribute only minor amounts of this type of pollution, the combined effect of an entire neighborhood can be serious. Homeowners are encouraged to take appropriate steps to not only limit runoff but to make sure the runoff stays clean.

### Steps You Can Take

Protecting our drinking water is everyone's responsibility. You can help protect your community's drinking water source in several ways.

### Maintain your septic system

Septic systems can contribute to source water contamination for various reasons, including improper location of the system, poor design, faulty construction, incorrect operation, and poor or no maintenance of the system. Malfunctioning or overflowing septic systems release bacteria and nutrients into the water cycle. Nutrients can cause algae blooms and excessive plant growth in lakes. Increased bacteria levels in groundwater, lakes and streams can present a public safety issue.

By following the basic recommendations below, you can help ensure that your system continues to function properly.

- Inspect your septic system annually.
- Pump out your septic system

regularly. (Pumping out every three to five years is recommended for a three-bedroom house with a 1,000-gallon tank, smaller tanks should be pumped more often.)

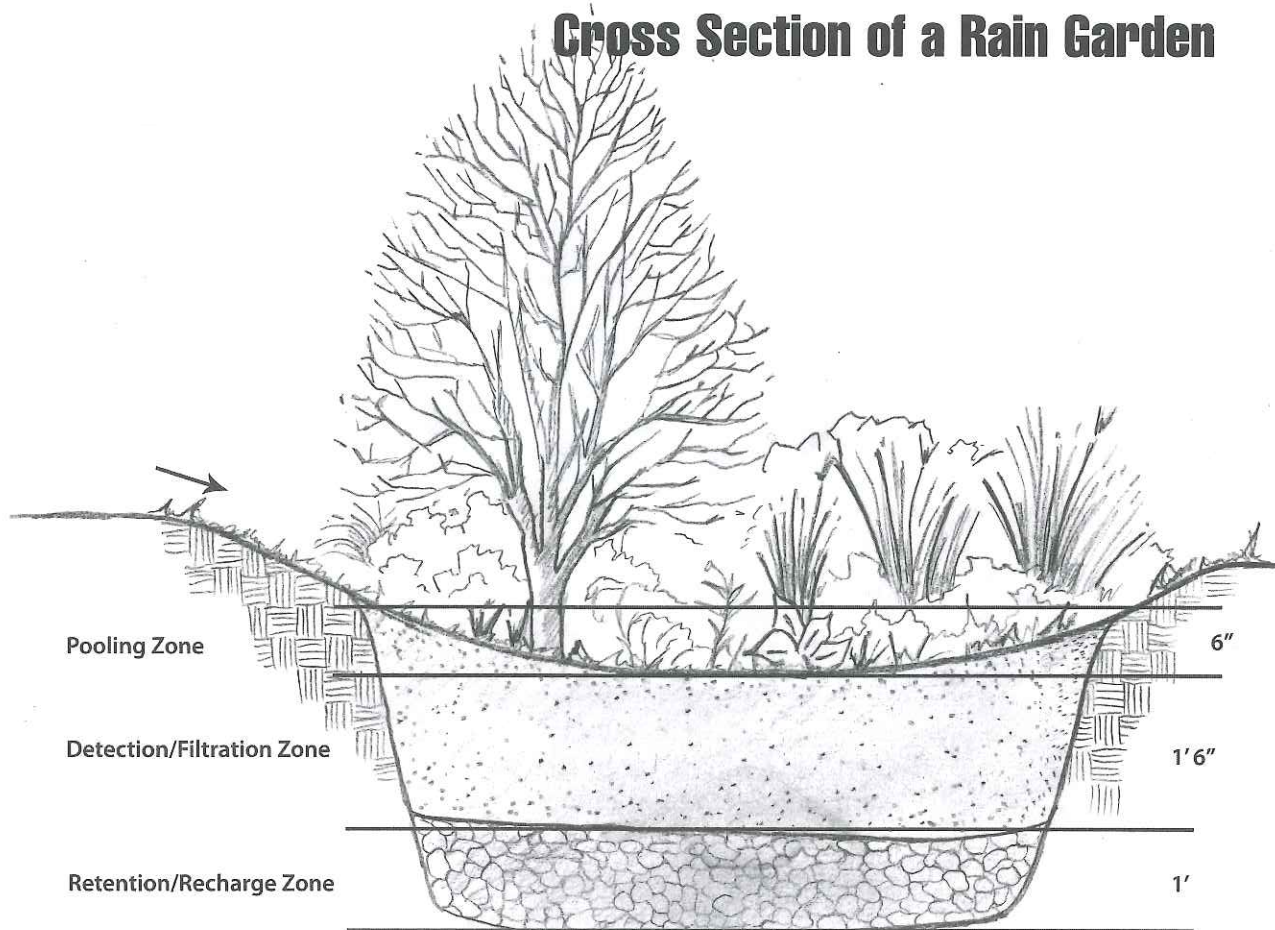
- Do not use septic system additives.
- Do not divert storm drains or basement pumps into septic systems.
- Avoid or reduce the use of your garbage disposal. (Garbage disposals send excess solids to your septic tank and can increase the frequency your tank needs to be pumped.)
- Don't flush trash. Excess solids can clog drainfields.
- Don't drive over the system or the drainfield. This can compact the soil and break the piping of the system.
- Check for signs of system failure, such as areas in the yard that remain moist during dry times, or spots of excessive grass or plant growth. If you see signs of failure, schedule an inspection and repairs immediately.
- If you sell your home, inform the new owner about your septic system and share maintenance records.

### Reduce your water consumption

Homeowners can significantly reduce the volume of wastewater discharged to a home septic system or a sewage treatment plant by conserving water. If your home has a septic system, by decreasing your water usage, you can help prevent your system from overloading and contaminating ground water and surface



## Cross Section of a Rain Garden



Drawing by Catlin Buckley. Adapted from [www.sustainablesouthcoast.org](http://www.sustainablesouthcoast.org).

water. (Seventy-five percent of drainfield failures are due to hydraulic overloading.)

- Use dishwashers and clothes washers only when fully loaded.
- Take short showers instead of baths and avoid letting faucets run unnecessarily.
- Replace old water fixtures with new water-efficient showerheads, faucets, and toilets. Look for the new WaterSense rating given by the EPA. This rating system helps consumers identify high-performance, water-efficient products that can reduce water use in the home and help preserve the nation's water resources.
- Repair and replace any

leaking fixtures immediately. (Nearly 14 percent of the water a typical homeowner pays for is never used—it leaks down the drain.)

### *Use household chemicals carefully*

- Many common chemicals around the home are toxic. Use non-toxic and water-based substitutes whenever possible.
- Buy chemicals only in the amount you expect to use and use them only as directed. Store chemicals properly to prevent leaks and access by children.
- Take unwanted chemicals to hazardous waste collection centers; do not pour them down the drain. Pouring chemicals down the drain

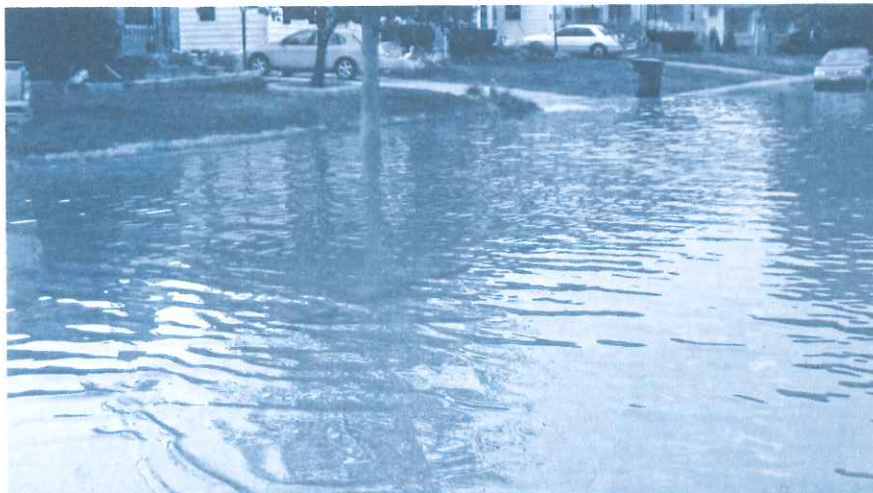
can corrode pipes and may disrupt your septic system or sewage treatment plant. Never pour chemicals on the ground. Soil cannot purify most chemicals, and they eventually will contaminate runoff.

- Use low-phosphate or phosphate-free detergents.

### *Landscape with nature*

- Select plants that have low requirements for water, fertilizers, and pesticides. Native plants are excellent choices. Your local extension office or local nursery can make some recommendations.
- Minimize grassy areas that require high maintenance.





Street flooding results from overwhelmed stormdrains. Diverting run-off from your property into a rain garden can reduce these consequences.

Use low maintenance ground covers or cover bare earth with mulch.

- Mulch all planting beds to reduce the need for watering.
- Preserve existing trees, and plant trees and shrubs to help prevent erosion.
- If you must irrigate, install a weather-based or sensor automatic system. These systems take into account recent rain events, relative humidity and temperature so they apply water only when necessary. (Weather-based irrigation controllers can save nearly 24 billion gallons per year across the U.S.—approximately equal to more than 7,000 hoses constantly running for a full year.) Adjust your sprinkler system so it doesn't water the driveway or other paved surfaces.
- Have the soil in your lawn and gardens analyzed to determine the proper type and rate of fertilizer needed and use natural alternatives rather than chemical fertilizers and pesticides if possible.
- If fertilizer falls on paved surfaces, sweep it off into the planting areas to keep it from going down the storm

drain. Don't apply pesticides or fertilizers before an expected rain due to the likelihood of runoff.

- Don't sweep or rake leaves or grass clippings into the street. Add them to the compost pile instead.

#### **Prevent automobile pollution**

- Regular tune-ups and inspections can help keep automotive waste and by-products from contaminating runoff. Clean up any spilled automobile fluids.
- Wash your car on the lawn where the greasy water can be filtered by the soil or take your car to a commercial carwash where the dirty water is treated properly.
- Dispose of used motor oil and antifreeze to recycling centers. Never put used oil down storm drains or in drainage ditches. (One quart of oil can contaminate up to 2 million gallons of drinking water.)

#### **Pick up after your pet**

Pet waste, when not disposed of properly, is one of many small sources of pollution in local waterways. Waste left to decompose on streets or in vegetated areas near streets may be washed into storm sewers that flow into local waters. The nutrients it contains encourages

excess algae growth, and the organisms it may carry makes water unsafe for swimming or drinking.

#### **Community Action**

- Participate in clean-up activities in your neighborhood.
- Write or call your elected representatives to inform them about your concerns and encourage legislation to protect water resources.
- Get involved in local planning and zoning decisions and encourage your local officials to develop erosion and sediment control ordinances.
- Promote environmental education. Help educate people in your community about ways they can help protect water quality.
- Get your community groups involved.

Source water is untreated water from streams, rivers, lakes or underground aquifers that is used to provide public drinking water, as well as to supply private wells used for human consumption. Protecting source water from contamination can reduce the cost of expensive treatment downstream.

The water that surrounds us—lakes, rivers, streams and aquifers—makes up our drinking water sources. When rain falls or snow melts, it picks up, carries and deposits pollutants into surrounding waters and even underground sources of drinking water. What we do in the watershed can directly impact the quality of water that arrives at the treatment plant.

By reducing and slowing the flow and improving the quality of the stormwater runoff that your property generates, you can greatly diminish the negative effects this water has on our watershed.



## Resources

### NESC's On Tap magazine articles:

"Rainwater Harvesting: Moderate Investment Can Yield Big Results"

[www.nesc.wvu.edu/pdf/dw/publications/ontap/magazine/OT\\_SU08.pdf](http://www.nesc.wvu.edu/pdf/dw/publications/ontap/magazine/OT_SU08.pdf)

"The State of Rainwater Harvesting"

[www.nesc.wvu.edu/pdf/dw/publications/ontap/magazine/OTFA08\\_features/StateRainwaterHarvestingUS.pdf](http://www.nesc.wvu.edu/pdf/dw/publications/ontap/magazine/OTFA08_features/StateRainwaterHarvestingUS.pdf)

"Xeriscaping™ Conserves Water"

[www.nesc.wvu.edu/pdf/dw/publications/ontap/magazine/OT\\_SP08.pdf](http://www.nesc.wvu.edu/pdf/dw/publications/ontap/magazine/OT_SP08.pdf)

### Pipeline newsletters

"Watershed Management," (Fall 2006) at [http://www.nesc.wvu.edu/pdf/WW/publications/pipeline/PL\\_FA06.pdf](http://www.nesc.wvu.edu/pdf/WW/publications/pipeline/PL_FA06.pdf)

"Septic Systems and Source Water Protection," (Summer 2008) at [http://www.nesc.wvu.edu/pdf/WW/publications/pipeline/PL\\_SU08.pdf](http://www.nesc.wvu.edu/pdf/WW/publications/pipeline/PL_SU08.pdf)

Pipeline newsletters address drinking water and wastewater issues for homeowners and small community officials. Additional

Pipelines are available in pdf format at: [www.nesc.wvu.edu/pipeline.cfm](http://www.nesc.wvu.edu/pipeline.cfm).

NESC's website has a section devoted to water conservation. Read more about saving water at [www.nesc.wvu.edu/subpages/conservation.cfm](http://www.nesc.wvu.edu/subpages/conservation.cfm)

Other resources on the web include:

"Rain Gardens in Connecticut – A Design Guide for Homeowners" from the University of Connecticut Cooperative Extension System. Can be downloaded at [www.sustainability.uconn.edu/pdf/raingardenbroch.pdf](http://www.sustainability.uconn.edu/pdf/raingardenbroch.pdf)

Rain barrel information from the University of Rhode Island is available at [www.uri.edu/ce/healthylandscapes/rainbsources.html](http://www.uri.edu/ce/healthylandscapes/rainbsources.html)

### U.S. Environmental Protection Agency

Source Water Protection Practices Bulletin "Managing Septic Systems to Prevent Contamination of Drinking Water" can be downloaded at [www.nesc.wvu.edu/pdf/ww/septic/epa\\_septicwater\\_protection.pdf](http://www.nesc.wvu.edu/pdf/ww/septic/epa_septicwater_protection.pdf)

"Managing Nonpoint Source Pollution from Households" is available at [www.epa.gov/owow/nps/facts/point10.htm](http://www.epa.gov/owow/nps/facts/point10.htm)

NonPoint Source Pollution Kids' Page at [www.epa.gov/owow/nps/kids/](http://www.epa.gov/owow/nps/kids/)

You can find all of EPA's WaterSense rated products at [www.epa.gov/watersense/products/index.html](http://www.epa.gov/watersense/products/index.html).

"Your Water Your Decision" is an initiative by the Source Water Collaborative (SWC) to educate local decision makers about their options for protecting drinking water sources. SWC is dedicated to protecting America's drinking water at the source—in the lakes, rivers, streams and aquifers we tap for drinking purposes, by combining the strengths of a diverse set of member organizations. Members include EPA's Office of Groundwater and Drinking Water and the Office of Wetlands, Oceans and Watersheds, as well as the National Environmental Services Center, and 19 other organizations. Decision-making guides, toolkits and other informational materials relevant to this initiative are available at the SWC website at [www.protectdrinkingwater.org](http://www.protectdrinkingwater.org).

### Reprint Info

Readers are encouraged to reprint *Pipeline* articles in local newspapers or include them in flyers, newsletters, or educational presentations. Please include the name and phone number of the National Environmental Service Center (NESC) on the reprinted information and send us a copy for our files. If you have any questions about reprinting articles or about any of the topics discussed in this newsletter, please contact the NESC at (800) 624-8301.



## RELATED NESC PRODUCTS

### **Quality Development and Stormwater Runoff**

What You Can Do to Reduce Flooding,  
Erosion and Pollution

Watershed Committee of the Ozarks

This fact sheet discusses and illustrates methods to properly manage stormwater runoff by highlighting several residential, commercial, and industrial best management practices to help reduce flooding, erosion, and pollution. Common runoff pollutants are identified such as heavy metals, pesticides, fertilizers, bacteria and soil sediments.

Item # GNFSPE07 . . . . . \$0.35

### **Alternative Household Cleaning Solutions**

National Environmental Services Center

This fact sheet provides less-toxic alternatives for cleaning and home improvement jobs around the house.

Item #GNFSPE109 . . . . . \$0.35

#### **How to Order NESC Products**

To place an order, call us toll free at (800) 624-8301 or (304) 293-4191 or send email to [info@mail.nesc.wvu.edu](mailto:info@mail.nesc.wvu.edu). Be prepared to give the item number and title of the product you wish to order. Shipping charges will apply.

### **Polluted**

U.S. Environmental Protection Agency

This brochure folds out to graphically show various sources of runoff (such as: forestry, agriculture, urban stormwater, residential, and construction). Activities the community can initiate are listed that will help reduce the effects of runoff and pollution entering nearby waterways. A list of regional EPA Nonpoint Source Coordinators is included.

Item # GNBPRPE51 . . . . . Free

### **Water Conservation In Your Home**

American Ground Water Trust

This booklet explains to homeowners the many benefits of water conservation. Practical tips are offered on how to lower water usage all around the house: in the kitchen, bathroom, laundry and yard.

Item # DWBLPE149 . . . . . \$1.90



**NESC Assistance. Solutions. Knowledge.**